Trend Study 18B-35-07

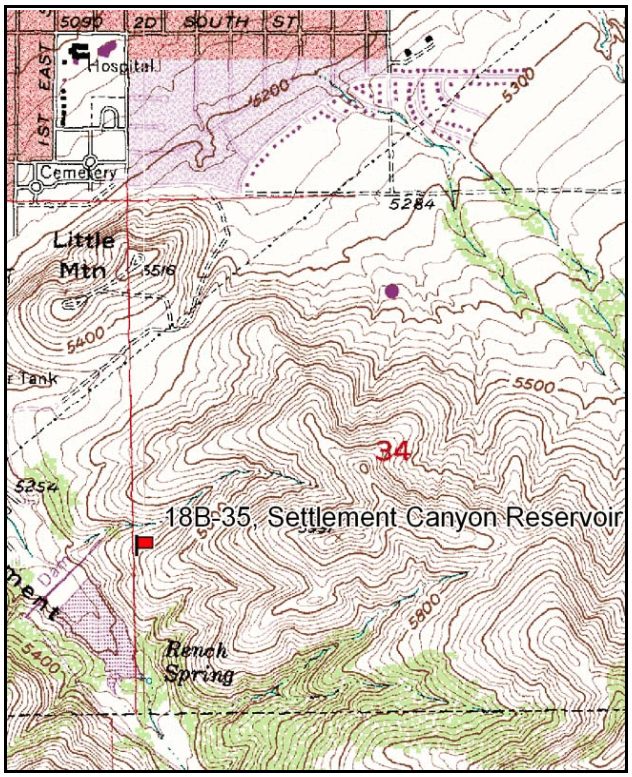
Study site name: Settlement Canyon Reservoir . Vegetation type: Mountain Big Sagebrush .

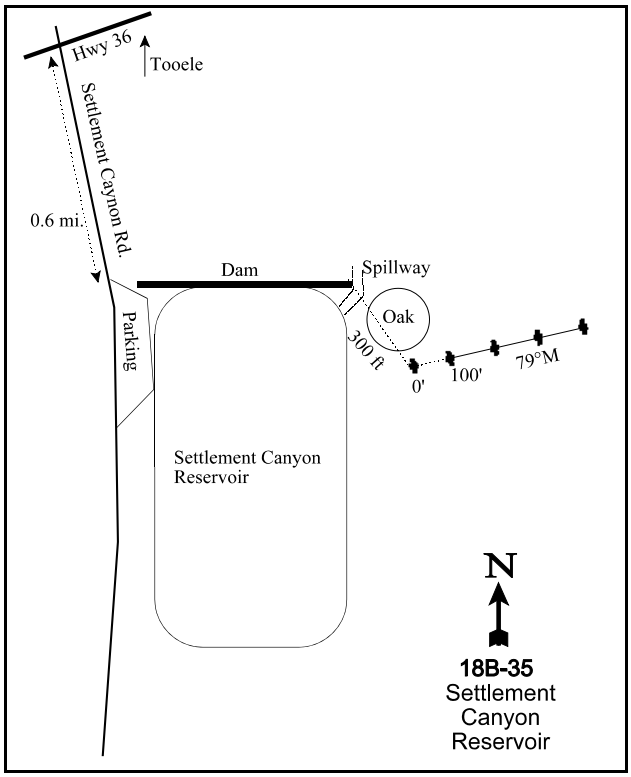
Compass bearing: frequency belt 79 degrees magnetic.

Frequency belt placement: line 1 (11ft & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft).

LOCATION DESCRIPTION

From the intersection of Hwy 36 and Settlement Canyon Road in Tooele, drive 0.6 miles to the parking lot at Settlement Canyon Reservoir. Walk across the dam and spillway. From the spillway, walk southeast up the ridge (there is a well worn trail) for 300 foot through an oak patch. Get above the oak and walk along the contour a short distance to the 0-foot stake marked by browse tag #246. There is a rock cairn next to the 0-foot stake.





Map Name: Tooele

Diagrammatic Sketch

Township 3S , Range 4W , Section 33

GPS: NAD 83, UTM 12T 390482 E 4485386 N

DISCUSSION

Settlement Canyon Reservoir - Trend Study No. 18B-35

Study Information

This study was established in 2002 to replace the Left Fork Settlement Canyon (18B-9) trend study [elevation: 5,500 feet (1,676 m), slope: 22%, aspect: west]. The new study is more representative of critical winter range in the area and is more heavily used by deer and elk. It samples a mountain big sagebrush slope located east of the Settlement Canyon Reservoir dam. Deer use the area heavily and pellet group transect data estimates were 90 days use/acre in 2002 and 137 in 2007 (223 ddu/ha in 2002 and 337 in 2007). Most pellet groups were from winter use, but some were from spring and early summer.

Soil

The soil is in the Broad-Reywat outcrop association, which consists of shallow to moderately deep, well drained, moderately to slowly permeable soils that formed in residuum and colluvium from quartzite, sandstone, andesite, or basalt parent materials on hills, plateaus, and mountainsides (USDA-NRCS 2007). It is shallow and rocky. Rocks are common on the surface and within the profile. The texture is a clay loam with a neutral reaction (pH of 6.6). Protective ground cover is abundant. Relative bare ground cover was only 4% in 2002 and 2007. The erosion condition class was stable in 2002 and 2007.

Browse

This is a mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) community with an estimated density of 3,240 plants/acre (8,002 plants/ha) in 2002 and 2,880 (7,114/ha) in 2007. Utilization was moderate-heavy in 2002 and 2007. Decadence was moderately high in 2002 (38%) and 2007 (40%). Plants classified as dying made up 13% of the population in 2002 and 20% in 2007. Most mature plants were vigorous with an annual leader growth average of 2.1 inches (5.2 cm) in 2002 and 1.5 inches (3.8 cm) in 2007. Young recruitment was only 3% of the population in 2002 and 4% in 2007, which is not enough to compensate for the overall density loss. No seedling sagebrush were sampled in 2002, but 20 seedlings/acre were sampled in 2007. The only other shrubs sampled were broom snakeweed (*Gutierrezia sarothrae*), creeping barberry (*Mahonia repens*), and pricklypear cactus (*Opuntia* sp.).

Herbaceous Understory

The herbaceous understory is abundant; it provided nearly 40% cover in 2002 and nearly 50% in 2007. However, species composition is poor. Bulbous bluegrass (*Poa bulbosa*), a poor value perennial, is the dominant species. It provided 19% cover in 2002 and 22% in 2007 and had a quadrat frequency of 96% both years. Bluebunch wheatgrass (*Agropyron spicatum*) provided 8% cover in 2002 and 10% in 2007. Japanese brome (*Bromus japonicus*) and cheatgrass (*Bromus tectorum*), both winter annuals, were also relatively abundant, but provided little cover in 2002 and 2007. Other perennial grasses include purple-threeawn (*Aristida purpurea*), Kentucky bluegrass (*Poa pratensis*), and Sandberg bluegrass (*Poa secunda*).

The forb composition is diverse with 27 species sampled in 2002 and 30 species in 2007. The composition is weedy. In 2002, the dominant forb was the noxious weed dalmatian toadflax (*Linaria dalmatica*), it provided 2% cover. In 2007, it had decreased to less than 1% cover and the quadrat frequency decreased by 60%. Other common forbs include hooker balsamroot (*Balsamorhiza hookeri*), rock goldenrod (*Petradoria pumila*), and mulesear (*Wyethia amplexicaulis*).

2007 TREND ASSESSMENT

The browse trend is slightly down. The density of sagebrush, the key browse species, decreased 11%. This decrease may be due to the lack of young plants and seedlings to recruit into the population. The decadence changed little, but plants classified as dying increased from 13% of the population to 20%. Sagebrush utilization remained moderate-high. The grass trend is stable. The sum of the nested frequency of perennial

grasses, excluding bulbous bluegrass, increased 16%, but the nested frequency of bulbous bluegrass increased significantly. The sum of nested frequency of annual grasses increased 20% and the nested frequency of Japanese brome increased significantly. The forb trend is slightly up. The sum of the nested frequency of perennial forbs, excluding dalmatian toadflax, increased 16% and the nested frequency of dalmatian toadflax decreased significantly. Toadflax cover decreased substantially as well. The Desirable Components Index (DCI) score in 2002 was poor due to moderate browse cover, low percentage of young plants, moderate perennial grass cover, and excellent perennial forb cover. The DCI score in 2007 increased to fair-good due to an increase in perennial grass cover.

2002 winter range condition (DCI) - poor (46) Mid-level potential scale
2007 winter range condition (DCI) - fair-good (51) Mid-level potential scale
browse - slightly down (-1) grass - stable (0) forb - slightly up (+1)

HERBACEOUS TRENDS --
Management unit 18B, Study no: 35

Type	Species	Nested Frequency '02	Nested Frequency '07	Average Cover % '02	Average Cover % '07
G	Agropyron spicatum	a280	a267	8.05	10.43
G	Aristida purpurea	a25	a17	.39	.25
G	Bromus japonicus (a)	a102	b134	.29	.47
G	Bromus tectorum (a)	a139	a138	1.50	2.24
G	Festuca myuros (a)	-	15	-	.08
G	Poa bulbosa	a389	b416	18.62	21.97
G	Poa pratensis	1	-	.03	-
G	Poa secunda	a17	b91	.14	1.99
G	Vulpia octoflora (a)	-	3	-	.00
Total for Annual Grasses		241	290	1.79	2.81
Total for Perennial Grasses		712	791	27.25	34.66
Total for Grasses		953	1081	29.04	37.47
F	Agoseris glauca	a9	a10	.07	.05
F	Alyssum alyssoides (a)	a27	a23	.08	.04
F	Allium sp.	a10	a3	.01	.00
F	Ambrosia psilostachya	2	-	.00	-
F	Artemisia ludoviciana	a4	a6	.15	.03
F	Astragalus cibarius	a24	a17	.29	.21
F	Asclepias sp.	-	-	-	.03
F	Aster sp.	a8	a5	.19	.18
F	Astragalus utahensis	a11	a8	.07	.05
F	Balsamorhiza hookeri	a44	b54	1.40	2.33
F	Calochortus nuttallii	a17	a5	.09	.02
F	Cirsium sp.	a10	a15	.45	.27

Type	Species	Nested Frequency		Average Cover %	
		'02	'07	'02	'07
F	Collomia linearis (a)	1	-	.00	-
F	Comandra pallida	$_{a}$21	$_{b}$53	.29	.41
F	Collinsia parviflora (a)	-	33	-	.42
F	Cordylanthus ramosus (a)	-	1	-	.00
F	Crepis acuminata	$_{b}$35	$_{a}$20	.17	.12
F	Cryptantha sp.	-	3	-	.00
F	Cymopterus sp.	$_{a}$18	$_{a}$7	.14	.02
F	Descurainia pinnata (a)	-	3	-	.03
F	Draba sp. (a)	-	171	-	.29
F	Eriogonum racemosum	$_{a}$24	$_{a}$35	.22	.52
F	Heterotheca villosa	$_{a}$39	$_{a}$39	.89	2.17
F	Holosteum umbellatum (a)	$_{a}$3	$_{b}$98	.01	.21
F	Linaria dalmatica	$_{b}$122	$_{a}$49	2.45	.51
F	Linum lewisii	-	1	-	.00
F	Petradoria pumila	$_{a}$42	$_{a}$51	1.54	1.97
F	Phlox longifolia	$_{a}$45	$_{b}$77	.22	.49
F	Polygonum douglasii (a)	$_{a}$2	$_{a}$8	.01	.01
F	Ranunculus testiculatus (a)	$_{a}$9	$_{a}$4	.01	.01
F	Tragopogon dubius	$_{a}$8	$_{a}$15	.15	.04
F	Viola sp.	1	-	.00	-
F	Wyethia amplexicaulis	$_{a}$23	$_{a}$30	1.01	1.18
F	Zigadenus paniculatus	$_{a}$6	$_{a}$11	.13	.11
Total for Annual Forbs		42	341	0.11	1.02
Total for Perennial Forbs		523	514	10.02	10.78
Total for Forbs		565	855	10.14	11.81

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Management unit 18B, Study no: 35

Type	Species	Strip Frequency		Average Cover %	
		'02	'07	'02	'07
B	Artemisia tridentata vaseyana	77	73	12.28	10.05
B	Gutierrezia sarothrae	41	33	1.46	.57
B	Mahonia repens	2	1	.03	.01
B	Opuntia sp.	22	22	.33	.24
Total for Browse		142	129	14.11	10.88

CANOPY COVER, LINE INTERCEPT --
Management unit 18B, Study no: 35

Species	Percent Cover	
	'02	'07
Artemisia tridentata vaseyana	12.18	14.26
Gutierrezia sarothrae	.85	.30
Opuntia sp.	.16	.03

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 18B, Study no: 35

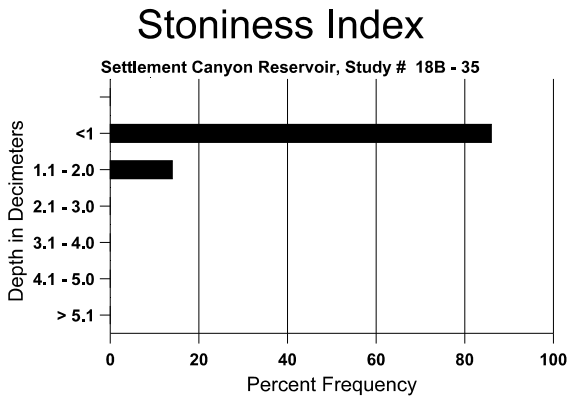
Species	Average leader growth (in)	
	'02	'07
Artemisia tridentata vaseyana	2.1	1.5

BASIC COVER --
Management unit 18B, Study no: 35

Cover Type	Average Cover %	
	'02	'07
Vegetation	47.58	55.34
Rock	24.67	21.56
Pavement	6.13	4.69
Litter	30.61	23.81
Cryptogams	3.65	3.48
Bare Ground	4.59	4.68

SOIL ANALYSIS DATA --
Herd Unit 18B, Study no: 35, Settlement Canyon Reservoir

Effective rooting depth (in)	Temp °F (depth)	pH	Clay loam			%0M	ppm P	ppm K	dS/m
			%sand	%silt	%clay				
5.5	55.6 (8.1)	6.6	36.9	32.4	30.7	3.2	21.7	259.2	1.0



PELLET GROUP DATA --
Management unit 18B, Study no: 35

Type	Quadrat Frequency	
	'02	'07
Rabbit	-	15
Elk	-	10
Deer	51	38

Days use per acre (ha)	
'02	'07
-	-
-	-
90 (223)	137 (337)

BROWSE CHARACTERISTICS --
Management unit 18B, Study no: 35

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Artemisia tridentata vaseyana												
02	**3240**	-	100	1920	1220	540	31	45	38	13	13	14/29
07	**2880**	20	120	1600	1160	180	32	34	40	20	21	15/33
Gutierrezia sarothrae												
02	**1860**	20	120	1480	260	160	0	0	14	13	13	7/9
07	**1300**	-	60	1180	60	-	5	0	5	-	0	7/10
Mahonia repens												
02	**440**	-	-	440	-	-	0	0	-	-	0	1/4
07	**140**	-	-	140	-	-	0	0	-	-	0	-/-

		Age class distribution (plants per acre)					Utilization					
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% dying	% poor vigor	Average Height Crown (in)
Opuntia sp.												
02	**800**	-	200	500	100	40	0	0	13	8	8	5/10
07	**560**	20	40	520	-	-	0	0	0	-	0	5/11